

CLAIMS

We claim:

1. A solar cell assembly for use in an outer space environment or a non-Earth environment, comprising:

a photovoltaic conversion layer configured to produce an electrical current when receiving photons on a first side of said photovoltaic conversion layer;

a thermally conductive layer thermally coupled to a second side of said photovoltaic conversion layer; and,

a heat radiating layer coupled to said thermally conductive layer to radiate heat energy from said photovoltaic conversion layer.

2. The solar cell assembly of claim 1, wherein said thermally conductive layer is constructed from a metal or a metal alloy.

3. The solar cell assembly of claim 2, wherein said metal comprises stainless steel.

4. The solar cell assembly of claim 1, wherein said heat radiating layer comprises a black body radiating layer.

5. The solar cell assembly of claim 4, wherein said black body radiating layer comprises a layer of chromium oxide.

6. The solar cell assembly of claim 1, wherein a temperature of said photovoltaic conversion layer is maintained below a predetermined temperature by radiating heat energy from said photovoltaic conversion layer.

7. The solar cell assembly of claim 6, wherein said predetermined temperature is 110 degrees Celsius.

8. The solar cell assembly of claim 1, further comprising:

a first layer proximate said first side of said photovoltaic conversion layer for absorbing and radiating electromagnetic radiation from said assembly to reduce a temperature of said photovoltaic conversion layer.

9. The solar cell assembly of claim 8, wherein said first layer is configured to have an emissivity level greater than or equal to 0.8.

10. The solar cell assembly of claim 8, wherein said first layer has a thickness greater than 10 microns.

11. The solar cell assembly of claim 8, wherein said first layer is constructed from a silicon compound selected from the group consisting of silicon oxides, silicon nitrides, silicon oxynitrides, silicon oxycarbides, silicon carbides, silicon nitrocarbides, silicon oxynitrocarbides, and mixtures thereof.

12. A method for controlling a temperature of a solar cell assembly used in an outer space environment or a non-Earth environment, the assembly having a first side and a second side opposite the first side, the method comprising:

receiving a plurality of photons on said first side of said solar cell assembly;

converting energy from a first portion of said plurality of photons into electrical energy; and,

radiating heat energy from said second side of the solar cell assembly using a radiating layer thermally coupled to the second side.

13. The method of claim 12, further comprising:

absorbing energy from a second portion of the plurality of photons and radiating the energy from the second portion of the plurality of photons away said first side of said solar cell assembly.

14. The method of claim 12, wherein said temperature of said solar cell assembly is maintained below a predetermined temperature.

15. The method of claim 14, wherein said predetermined temperature is 110 degrees Celsius.